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WATER STORAGE

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A Report Submitted To The

Fifty-third Montana Legislature

by

Governor Marc Racicot

pursuant to
Montana Code Annotated, Sec. 85-1-704 (1991)

January 1993

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I. INTRODUCTION

The Governor is required by statute to submit a report on water storage to the Montana Legislature each regular session. This report reviews current state water storage policy and statutory criteria used for prioritization of proposed projects. It identifies specific water storage projects proposed for development, including the rehabilitation of existing projects and one new project. It also provides a summary of water storage rehabilitation projects in progress during the previous 2 years. Descriptions are provided for each project on location, background, current status, and implementation strategy. Attached as appendix "A", is the justification for the prioritization of proposed water storage-related projects.

II. WATER STORAGE POLICY AND STATUTORY CRITERIA

The 1991 Montana Legislature passed into law a policy on water storage to define when storage is the best solution for solving specific water problems. If it is determined that storage is the best alternative, the policy identifies criteria to use in ranking state-funded projects (Sections 85-1-701 through 704 MCA). This law is based on the water storage section of the state water plan that was developed over a two-year period by three technical committees and the State Water Plan Advisory Council, with participation and advice from the Governor's Office and the Legislative Water Policy Committee. Montana's water storage policy is as follows:

> *The legislature recognizes that water resources needs are growing, existing water facilities are aging and in need of repair, and new water storage projects have become more difficult to complete. Other types of actions will be needed to solve many emerging problems, but if water storage is the best way to meet growing water needs and solve problems, then it should be actively pursued.*

In determining the best solution for a particular water management problem, the state shall:

a. carefully define the problem;
b. identify all options to solve the problem, including water storage;
c. determine whether water is physically and legally available to solve the problem; and
d. select the option that best meets the following criteria:
i. technical feasibility
ii. financial feasibility
iii. economic feasibility
iv. political feasibility
v. legal feasibility, and
vi. environmental feasibility

The statute continues by calling for this report to the legislature and describing its required contents. In addition, the statute identifies different criteria to be used to prioritize new water storage projects, storage rehabilitation projects, and budget priorities for the allocation of state water storage development funds.

Section 85-1-704 ***Prioritization of water storage projects - governor's report,*** *states:*

(1) The governor shall submit to each regular session of the legislature a report identifying specific water storage projects proposed for development, including the rehabilitation of existing projects and new project proposals. The report must contain:

(a) a list of water storage project priorities;

(b) an implementation strategy for each priority project that identifies the resources (including specific budget requests), government actions, and other actions needed to accomplish the project; and

(c) a progress report on the development of water storage projects during the previous 2 years.

(2) In setting priorities among new water storage projects, the governor shall consider whether a project:

a) solves a severe water problem;

b) provides multiple uses and benefits;

c) provides for public uses;

d) shows strong evidence of broad citizen support;

e) is able to obtain non-state sources of funding;

f) protects and seeks to enhance social, ecological, cultural, aesthetic values;

g) improves local and state economic development;

h) could resolve Indian and federal reserved water rights issues;

i) supports water conservation activities; and

j) promotes the use of water reserved under Montana law.

(3) In setting priorities among water storage rehabilitation projects, the governor shall consider whether the project:

a) is needed to protect public safety;

b) has impacts if not repaired or rehabilitated; and

c) accomplishes the goals listed in subsection (2)(a) through (2)(j).

(4) In establishing budget priorities for the allocation of state water storage development funds:

a) First preference must be given to projects that resolve threats to life and property posed by high-hazard facilities that are in an unsafe condition;

b) Second preference must be given to projects that improve or expand existing water storage facilities; and

c) Third preference must be given to the planning and construction of new water storage facilities.

III. WATER STORAGE PROJECTS PRIORITIZED

The following list of water storage projects is prioritized using the criteria identified by state statute:

Rehabilitation Projects

1. TONGUE RIVER DAM REHABILITATION

2. NORTH FORK SMITH RIVER DAM REHABILITATION

3. TIN CUP LAKE DAM REHABILITATION

4. LONE TREE DAM REHABILITATION STUDY

5. MALTA IRRIGATION DISTRICT
   CANAL EFFICIENCY IMPROVEMENT

6. BEARPAW LAKE DAM REHABILITATION

New Project

1. CHERRY CREEK RESERVOIR PROJECT

IV. BACKGROUND AND IMPLEMENTATION STRATEGIES FOR PROJECTS

This section describes each project in detail. Project descriptions include background, current status, implementation strategy, and a summary.

A. REHABILITATION OF WATER STORAGE PROJECTS

Before discussing the projects, an understanding of a few basic principles and terms is important. Design standards have evolved considerably since the construction of many of the state's dams. Many dams have been classified as "unsafe" because their spillways are unable to withstand and route a probable maximum flood (PMF). A PMF is the flood that would result from a storm caused by a combination of extreme meteorological and hydrological conditions. Additionally, many storage projects are unsafe because they have deteriorated since construction and are in need of repair.

The highest priority for repair and rehabilitation is assigned to dams classified as unsafe and "high-hazard." It should be noted that a dam is classified *as high-hazard* because its failure has the potential for loss of human life and not because of its structural integrity or condition. Repair of a project allows it to, once again, function as originally designed. Dam repair may not bring a facility up to current design standards. Rehabilitation involves upgrading existing projects to comply with or exceed current design standards and often includes repair work. The capacity of storage projects is often increased during rehabilitation, provided enlargement is a cost-effective alternative.

The following projects are subject to the state's new statutory criteria because they are still in the planning stage. Some of these projects have been in the planning stage for years and others for only a short period of time. As the state's top priority, the rehabilitation of the Tongue River Dam will require all funds currently available in the water storage special revenue account (Section 85-1-631 MCA). The remaining proposed projects have been recommended for either loans and/or grants following the application review process of the Montana Water Development Program.

1) TONGUE RIVER DAM REHABILITATION

The Tongue River Dam is located in southeastern Montana 10 miles north of the point where the Tongue River flows into Montana from Wyoming. The Tongue River carves a 265 mile-long valley from its headwaters in Wyoming's Bighorn Mountains to its confluence with the Yellowstone River at Miles City, Montana.

Description

The existing dam embankment is 91 feet high and 1,824 feet long, with a crest width of 55 feet. The reservoir has a surface area of 3,200 acres and a capacity of nearly 70,000 acre-feet of water. The reinforced concrete spillway is 350 feet wide at its crest and 100 feet wide at its base. The maximum discharge capacity of the outlet works is approximately 4,000 cubic feet per second (cfs). The reservoir measures approximately 8 miles in length and averages one-half mile in width.

Background

As an interstate river, the Tongue River is subject to the terms of *The Yellowstone River Compact* between Montana, North Dakota, and Wyoming. The Tongue River project provides a reliable supply of water for the irrigation of 15,000 acres of land between the dam and Miles City. Nearly all the water used for irrigation supports alfalfa, feed barley, and pasture for the livestock industry. Water under contract from the project includes 39,300 acre-feet for irrigation, 7,500 acre-feet of which is dedicated for use by the Northern Cheyenne Tribe. The state fish hatchery in Miles City has contracted for 650 acre-feet of water and the St. Labre Mission in Ashland has contracted for 50 acre-feet for a total of 40,000 acre-feet of water.

During a moderate flood in May, 1978, the dam developed structural problems when spilling water severely eroded areas behind each of the wingwalls at the spillway's lower end. This damage took place during a spillway flow of 6,800 cfs. The spillway originally was designed to accommodate a flow of 98,000 cfs. The approximately $1 million in damage to the spillway during the flood of 1978 illustrates the deficiencies of the Tongue River Dam and underscores the magnitude of the threat posed by a large-scale flood.

A Corps of Engineers dam inspection culminated in the Tongue River Dam's classification as both an unsafe and high-hazard dam. The unsafe classification is based on the fact that the spillway's capacity to accommodate large releases is deficient. Even a moderate flood would likely cause the spillway to fail with disastrous consequences. As a *high-hazard* facility, the potential for the loss of human life and property is great. The project has an 8.2 percent chance of failure within 10 years.

If the dam failed, estimates place nearly 7,000 lives at risk and an economic cost that would range from $300 to $500 million. The region's economy would suffer greatly from the prolonged loss of irrigation and recreation opportunities. The Northern Cheyenne Tribe would lose its 7,500 acre-feet of contracted water indefinitely. Important wildlife habitat would also be lost for a number of years. Since the flood of 1978, DNRC has, when possible, operated the reservoir at reduced capacity to avoid use of the spillway.

Current Status

The reservoir currently is able to provide a firm annual yield of 32,000 acre-feet, although it was designed to provide an annual yield of 40,000 acre-feet. The usable capacity of the reservoir is 68,040 acre-feet, and average storage amounts to 48,210 acre-feet. Because of abundant summer rains, the reservoir was full as of mid-July 1992. Under these conditions, a significant precipitation event easily could create a hazardous situation for the dam and the downstream population.

The Tongue River Reservoir is important to the settlement of the Northern Cheyenne Tribe's federal reserved water rights. A compact negotiated between the tribe and the state makes up to 20,000 more acre-feet of water available to the tribe annually from the proposed dam rehabilitation and reservoir enlargement. It also protects the tribe's existing annual contract for 7,500 acre-feet of water. The legal settlement and the state's preferred plan call for construction of a new spillway with an additional 4 feet in crest height. The repair and enlargement of the dam will result in a safe structure and increase the firm annual yield to 63,000 acre-feet. Legislation to ratify the settlement and authorize federal cost-share funding for the project was passed by Congress and signed by President Bush September 30, 1992.

Implementation Strategy

Federal legislation requires the Secretary of the Interior to enter into a cooperative agreement for planning, design, construction, and environmental compliance on the Tongue River Dam project. That agreement will be negotiated and completed by early 1993. Preliminary work has begun on preparing the environmental impact statement (EIS). Final project design, which will last one and one-half years, will begin in late 1993. After authorization, the final design stage will proceed and the federal-state joint EIS will be completed. Construction would begin during the spring of 1995 and be complete by fall of 1997. The proposed 1994-95 biennium funding arrangement for the Tongue River Dam rehabilitation project calls for $1,415,000 from water development funds, $460,000 of water storage account funds, and $11,256,000 in federal funds, for a total of $13,131,000.

Summary

The Governor's Office and DNRC have assigned a high priority to rehabilitating the Tongue River Dam due to its unsafe condition and *high-hazard* status. The project offers a viable solution to several significant water storage issues in southeastern Montana and satisfies the storage policy objectives of the state of Montana. As noted, the Tongue River project serves to settle the reserved water right claims of the Northern Cheyenne Tribe, supplements the supply of water in a semi-arid agricultural region, provides more opportunities for recreation, and is considered environmentally compatible. Finally, the rehabilitation is a cost-effective solution as it both increases water storage capacity and addresses a potentially hazardous situation.

2) NORTH FORK SMITH RIVER DAM REHABILITATION

The North Fork of the Smith River Dam and its reservoir, Lake Sutherlin, are located about 10 miles east of White Sulphur Springs in Meagher County.

Description

The dam measures 84 feet high and 1,300 feet long at its crest, and stores 11,500 acre-feet of water at the spillway crest. The average storage is 9,000 acre-feet and as of July 1992, the storage was close to 6,000 acre-feet. The water is used to irrigate 11,000 acres of project land and provides considerable recreation opportunities.

Background

The dam was constructed in 1936 to meet the dam safety standards of that time. Owned by DNRC, it is operated and maintained by the Smith River Water Users Association through water purchase contracts with DNRC. The Army Corps of Engineers (Corps) inspected the dam in 1980 under the National Dam Inspection Program. The dam was classified as *high-hazard* because its failure could result in loss of human life. The Corps declared the dam unsafe due to an inadequate spillway capacity to route the probable maximum flood (PMF).

Current Status

During the spring of 1989, DNRC contracted with HKM Associates, a consulting engineering firm, to perform a feasibility study for upgrading the dam to meet current federal and state dam safety standards. The study includes a geotechnical investigation, a flood hydrology analysis and subsequent spillway design, a water availability analysis, a rehabilitation plan with cost estimates for various alternatives, an environmental assessment, and a project evaluation that addresses the financial and economic feasibility of rehabilitation. Draft hydrology, geotechnical, and cultural resources reports have been completed.

The preferred dam rehabilitation alternative would increase the reservoir storage by raising the spillway crest 1.7 feet, constructing an auxiliary spillway to pass the appropriate spillway design flood, and raising the dam crest by 5 feet. A water development loan of $1,393,467 has been recommended to the legislature following completion of the application review process. The proposed project would have a total cost of $1,449,000.

HKM Associates developed three rehabilitation alternatives with preliminary cost estimates. All three alternatives were projected to cost $1.5 million, including engineering and construction administration. The preferred alternative would enhance fish and wildlife habitat and provide a minimum pool for increased recreation opportunities.

Implementation Strategy

Final design will begin once the feasibility study has been completed and funding acquired. At that time, the preferred alternative will be refined and a final engineer's cost estimate will be prepared. Although DNRC owns the land up to the existing dam crest elevation of 5496 feet, flood easements with private landowners and the state are necessary for about 120 acres of additional land needed for the flood pool. DNRC will purchase land needed for the auxiliary spillway.

Work that has yet to be completed includes a structural stability analysis of the existing and proposed dam embankment, feasibility study, final design of the dam rehabilitation, engineering cost estimate, cultural resources mitigation plan, final hydrology and geotechnical reports, and the preparation of construction contract documents. The project schedule for the North Fork of the Smith Dam rehabilitation calls for construction to begin in the fall of 1994.

Summary

A Water Development Program loan for $1,393,467 at 3 percent for 20 years has been recommended following review of the application submitted by DNRC. The proposal to rehabilitate the North Fork of the Smith River Dam satisfies state law by giving funding preference to an unsafe, high-hazard facility. The construction of an auxiliary spillway, raising the height of the existing spillway by 1.7 feet, and raising the dam embankment by 5 feet provides additional flood storage to reduce the potential for damage to life and property. Raising the spillway crest provides additional irrigation water and a minimum pool for fish, wildlife and recreation. DNRC is negotiating with the water users association for repayment of the revenue bond. A study indicated that the increased pool will increase angler days from the 1982-86 average of 4,188 to 6,500. The yearly net economic benefit of fishing will increase from $293,160 to $455,000.

3) TIN CUP LAKE DAM REHABILITATION

Tin Cup Lake Dam is located at the headwaters of Tin Cup Creek near the Montana-Idaho border approximately 14 miles southwest of Darby, Montana. The dam is located within the Selway-Bitterroot Wilderness Area of the Bitterroot National Forest.

Description

Tin Cup Lake Dam is an earth embankment structure 25 feet high. The dam has a crest width of 10 to 17 feet and a crest length of 437 feet. The dam has an active storage capacity of 2,420 acre-feet. The total storage capacity, to the dam crest elevation, is 2,800 acre-feet.

The primary purpose for the dam is to store water for irrigation and to supplement the natural creek water supply during late summer. The dam supplies irrigation water to approximately 1,300 acres of farmland. Additional benefits of the dam include limited flood control, ground water recharge, enhancement of instream flows for fisheries, public recreation opportunities, and improved water quality through the control of streambank erosion and stream sedimentation.

Background

Several modifications to the dam have been made since 1906 when it was originally constructed. However, the active storage of the dam has not been increased over the years. The dam is currently owned and operated by the Tin Cup Water Users Company, an organization of 54 local farmers and ranchers. The Tin Cup Water Company is planning to apply with the state to form a public water district.

Current Status

Tin Cup Lake Dam was inspected by the U.S. Army Corps of Engineers (Corps) in 1980 under the National Dam Inspection Program. The dam was classified as high- hazard by the Corps, the U.S. Forest Service and DNRC. At least four residences, several private, County, and State roads, bridges and utilities, and several hundred acres of agricultural land would be adversely impacted if the dam were to fail. The dam was originally classified as unsafe because of inadequate spillway capacity to route the probable maximum flood (PMF).

Implementation Strategy

The Tin Cup Water Company contracted with the consulting engineering firm of Druyvestein, Johnson and Anderson to develop alternatives for bringing the dam into compliance with current dam safety standards. A detailed study of the dam has been completed and the consultant has recommended the following major changes to the structure:

1) Improve the existing embankment by raising the dam crest approximately 2 feet, regrade and establish a constant slope on both the upstream and downstream faces of the structure, and place additional riprap protection on the upstream face of the dam.

2) Improve the spillway by replacing the existing deteriorated rock and mortar spillway crest, widen the spillway by approximately 20 feet, and upgrade the existing debris log boom arrangement and add additional riprap to the inlet and outlet channel slopes.

3) Improve the existing inlet/outlet works by replacing or lining the existing stone and mortar box culvert, replacing the existing log tower and inlet crib, replacing the existing headgate, and installing a reservoir level recording device.

The storage of the reservoir will not be increased. Druyvestein, Johnson and Anderson has estimated the cost of rehabilitation to be $280,742. An application by the Tin Cup Water Company for a water resource development loan of $304,204 at 3 percent interest for 20 years has been recommended to the 53rd Montana Legislature, which will act on the request. The application amount includes a $25,000 initial installment payment.

The dam is located entirely within the boundaries of the Selway-Bitterroot Wilderness Area. Special dispensation will have to be granted by the U.S. Forest Service for the rehabilitation project because motorized construction equipment is not authorized for use in wilderness areas.

Summary

If the legislature approves the recommended loan, final design will proceed and restoration of the Tin Cup Lake Dam should be completed in 1994. The completion of the project will bring the Tin Cup Lake Dam into compliance with the applicable dam safety standards. The project resolves the threat posed by a high-hazard, unsafe dam, while providing economic and recreational benefits to the state.

4) LONE TREE DAM REHABILITATION STUDY

The two Lone Tree Dams are located on Lone Tree Creek 3 miles west of Sidney, Montana. Sidney is located several miles west of Montana's boundary with North Dakota on the Yellowstone River.

Description

Lone Tree Ranch, Inc. is the owner of both dams. The existing project consists of two earthfill dams known as Vaux I and Vaux II. Vaux II is located one-half of a mile upstream of Vaux I and impounds 600 acre-feet of water at normal pool and 1175 acre-feet at the crest of the dam. As of November, 1992, Vaux 1 is drained and Vaux II is filled to normal pool level. Vaux I, the lower dam, impounds 250 acre-feet at normal pool and 685 acre-feet at the crest and serves as the only regulation for the irrigation releases. The Lone Tree Creek drainage measures approximately 83 square-miles in area.

Background

The dams originally were constructed to provide the Lone Tree Ranch with irrigation water. The original Vaux I was built in 1936 and measured approximately 20 feet high. The original Vaux II dam was built in 1944. In 1947, the height of Vaux II was raised to 40 feet and a spillway was constructed.

On March 26, 1951, both the Vaux I and II dams failed from overtopping during a high runoff. An ice jam on the crest of the Vaux II dam reduced the capacity of the spillway. After overtopping, a 200-foot section of the north abutment washed out. This caused Vaux I to be overtopped, washing out a 400-foot section of its south abutment. The failure caused extensive downstream flooding that included portions of Sidney. Although there was significant property damage in Sidney, no human lives were lost. Reconstruction of the dams in 1960 involved repair of the breached sections on both dams, and construction of a new spillway at the Vaux II Dam.

A considerable amount of residential development has taken place in the floodplain of the dams. This development proceeded without consultation with the owners of the dams. A 1978 engineering study by the Corps resulted in the dams being classified as *high-hazard*. This classification is based on the potential for loss of human life in the event of dam failure. The dams are also classified as unsafe due to inadequate spillway capacity and will require extensive modification to comply with Dam Safety Act regulations.

Current Status

Richland County's application has been recommended to the legislature for a $60,850 water development grant for a detailed engineering study and cost-benefit analysis of the rehabilitation of the dams. The results of the study will provide information needed by Lone Tree Ranch, the City of Sidney, and Richland County to evaluate alternatives for bringing the dams into compliance with the Dam Safety Act. The owner of the dams considered breaching the dams to relieve itself of liability in the event of failure because the cost of private rehabilitation is prohibitive. Richland County and the City of Sidney are concerned about flood protection for downstream residential development, the hospital, and the airport.

Lone Tree Ranch, Inc. has agreed to contribute $9,900 of the $70,750 total funding needed for the study. In addition to support from Richland County and the City of Sidney, DNRC has identified rehabilitation of the dams as a top priority. The costs outlined in the grant application and the objectives to be obtained from the study are well-documented and adequate. Since Richland County and the City of Sidney would benefit from this study, they will be asked to contribute to its funding.

Implementation Strategy

The project schedule calls for hydraulic studies to begin in April of 1993. Geotechnical work is scheduled to follow the hydraulic studies. Final plans and specifications will be drafted during the fall of 1993, and construction will begin in 1994.

Summary

The Lone Tree Dam rehabilitation study meets the criteria for funding of water storage rehabilitation projects set forth in Section 85-1-704 (3) MCA, which identifies projects that are needed to protect public safety and that would have negative impacts if not repaired or rehabilitated as high priority. In 1978, the Corps classified the Lone Tree Dams as *unsafe* due to the inability of the dam spillways to route the probable maximum flood (PMF), and *high hazard* because of the threat to human life in the event of dam failure.

The dams would continue to provide water for irrigation and flood protection if rehabilitation is a viable alternative. Indications of broad public support for the study are present if recreation opportunities would be accessible. The dam owner has committed 15 percent of the funds needed for the proposed study and as potential project beneficiaries, Richland County and Sidney will be asked to contribute to the study costs.

In conclusion, the proposed engineering study is appropriate at this time because a technical assessment of the feasibility of dam rehabilitation is necessary before an alternative can be selected. The condition of the dams presents the potential for loss of human life and for negative economic impacts. The proposal is consistent with the statutory criteria that support funding dam rehabilitation.

5) MALTA IRRIGATION DISTRICT CANAL EFFICIENCY IMPROVEMENT

The proposed project is located on the Dodson South Canal, which delivers water from the Milk River to Nelson Reservoir approximately 20 miles northeast of the town of Malta, in northcentral Montana.

Description

Dodson South Canal, the site of the proposed project, is supplied with water diverted from the Milk River. The Dodson Canal water distribution system is operated and maintained by the Malta Irrigation District which has applied for a $100,000 water development grant to rebuild eight check structures in the Dodson South Canal. The proposed project total cost estimate is $498,000. It is estimated that the project would allow an additional 13,000 acre-feet of water to be stored annually at Nelson Reservoir. Storage activities must be concluded before the nesting period of the piping plover, a "threatened species" under the Endangered Species Act. Storage would be increased because the project would enable water to be conveyed more efficiently to Nelson Reservoir.

Background

The Malta Irrigation District was constructed between 1909 and 1923 and comprises 42,492 acres. The district is responsible for operating and maintaining the Dodson South Canal, the location of the proposed project. An irrigation system rehabilitation and betterment study conducted by the U.S. Bureau of Reclamation indicated that new check structures were essential to keep the irrigation system operational. When water in the canals is at less than full capacity, check structures are used to raise the water high enough for it to run out of the turn-outs in the canal banks. The new automated check structures will be designed to U.S. Bureau of Reclamation standards and will have two 10-foot wide bays instead of the current 5-foot wide openings.

The proposed automated check structures will allow water storage at Nelson Reservoir to begin two weeks earlier each spring. In spring, melting pieces of ice tend to block flows through the 5-foot check structures. The ice will pass through the proposed automated structures, which will each have two 10-foot bays. It is important to begin storing water at Nelson Reservoir as early in spring as possible because the piping plover nests from May 1 to July 15 on the reservoir shoreline. This migratory shorebird is classified as a *threatened species* under the national Endangered Species Act. Storage during this period may result in flooding of nesting areas which can increase mortality rates of the piping plover.

The U.S. Bureau of Reclamation has an agreement with the U.S. Fish and Wildlife Service to maintain water levels in Nelson Reservoir that are compatible with the critical plover nesting period. Storing water before the piping plover nesting period also is important to the local agricultural economy. The majority of local runoff usually takes place over a very short time period. It is estimated that at the maximum flow of 500 cubic feet per second, the proposed automated check structures will allow the storage of an additional 13,000 acre-feet of water each year without interfering with the piping plover nesting season. Bowdoin National Wildlife Refuge, which contains 8,000 acres of waterfowl habitat and receives water from the Milk River via the canal system, also will benefit from the proposed project by receiving additional water earlier than usual.

Current Status

A $50,000 grant and a $50,000 loan have been recommended to the legislature for the Malta Irrigation District as a result of the Water Development Program application review process. A grant of $100,000 had originally been requested. The estimated cost of the proposed project is $498,000. The $398,000 difference will be covered by the Malta Irrigation District through user fees. An engineer has been hired by the district to design the check structures.

Implementation Strategy

If the legislature approves the grant application, funding would be available by July 1993. An environmental assessment by the U.S. Bureau of Reclamation and DNRC is required under the Montana Environmental Protection Act. The Endangered Species Act also must be reviewed because of the documented piping plover nesting activity at Nelson Reservoir.

The Malta Irrigation District manager will supervise all construction work. The project construction schedule calls for installing two of the eight proposed check structures each year through 1996. The replacement structures are all alike and will be placed at the location of the existing structures. Yearly construction would begin during the last week of October with the draining of the canal. Excavation and concrete work would continue through November and be complete by mid-December each year.

Summary

The Malta Irrigation District's Canal Efficiency Improvement Project meets the statutory requirements for rehabilitation prioritization which hold that projects that have negative impacts if not repaired or rehabilitated receive priority second only to those that are needed to protect public safety. The U.S. Bureau of Reclamation conducted a "rehabilitation and betterment" study of the Malta Irrigation District irrigation system and found that new check structures at Dodson Canal South were critical to keeping the water distribution system operational.

The proposed project addresses the deficiencies of the subject water conveyance and distribution system. The state's water policy identifies the improvement of existing water storage facilities as a priority in the allocation of state funds. This region has been experiencing drought conditions in recent years. The proposal addresses this potential water deficit by improving the existing system and the water storage capacity of the area within the constraints imposed by the Endangered Species Act and a limited time period for capturing critical run-off. It should be noted that the piping plover does not directly benefit from this project, although it is protected from adverse side effects that the project may pose.

The proposal will provide more water for irrigation, migratory bird habitat, and for recreation. The Malta Irrigation District and the Glasgow Irrigation District will benefit from the increased ability to store water within the seasonal and environmental constraints. Public flatwater recreation opportunities will increase at Nelson Reservoir due to the increase in the pool size. Fish habitat will be improved with the increase in reservoir volume. The potential exists for more storage at Bowdoin National Wildlife Refuge, which would benefit bird and wildlife habitat. No citizen opposition to the project has been documented.

In conclusion, the proposed project will increase the efficiency of a water conveyance system in need of rehabilitation. Approximately three quarters of the project funding will be generated by the irrigation districts through user fee scheduling. The project will also reduce seepage from the canal and decrease the salinity of adjacent lands, improving water quality. The proposed project benefits are supported by goals identified in the state water plan and the legislation governing the allocation priorities of water storage funding.

6) BEARPAW LAKE DAM REHABILITATION

Bearpaw Lake Dam is located on Beaver Creek within Beaver Creek Park, which is owned and operated by Hill County. The park is approximately 20 miles south of Havre, Montana.

Description

Bearpaw Lake Dam was constructed in 1958 and is owned and operated by the Department of Fish, Wildlife, and Parks (DFWP). The dam was constructed as a recreational resource and continues to serve that purpose. The zoned earthfill structure stands 59 feet high with a crest length of 380 feet. Lake levels are maintained by a two-bay, uncontrolled overflow chute spillway of reinforced concrete. A gated outlet works is available to release flows downstream as needed.

A center pier and the spillway side walls support a bridge for the road on the dam's crest, which is 20 feet wide. The reservoir's storage capacity is 535 acre-feet at the spillway crest, or normal pool and 905 acre-feet at the dam's crest. The lake's surface area is 36 acres and the drainage contains 49 square miles of land. Beaver Creek Reservoir, located 7 miles downstream, is a multi-purpose flood control, irrigation, and recreation project.

Background

The Army Corps of Engineers (Corps) classified the dam as presenting a "significant downstream hazard" potential in a March, 1980 inspection report. A 1980 Corps study of the Bearpaw Dam indicated that the dam would be overtopped when 9 percent of the probable maximum flood (PMF) takes place. In 1989, the dam was classified as high-hazard under Montana Dam Safety Act guidelines because of the potential for loss of life in the event of failure. A sudden breach of Bearpaw Lake Dam would damage bridges and the highway downstream and would endanger the lives of campers and recreationists who use the area extensively during the summer. No permanent residences are located downstream of the dam.

Current Status

A feasibility and risk-analysis study was conducted by an engineering consultant to determine whether Bearpaw Lake Dam would require complete rehabilitation, including spillway replacement, to meet Montana Dam Safety Act requirements. The study included a hydraulics analysis of the spillway and outlet works, watershed and flood hydrology, a geotechnical investigation and analysis, the preparation of rehabilitation alternatives, a recommendation of a preferred alternative, preliminary designs and cost estimates, an environmental analysis, and an estimate of future operation and maintenance needs. The consultant will be responsible for preparing the necessary documents to secure an operating permit as required by the Montana Dam Safety Act.

The DFWP will request $260,000 in funding from the 1993 Legislature through House Bill-5 to repair and rehabilitate the dam. It has been determined that repair of the dam will be sufficient to address the safety concerns at the site. Complete rehabilitation, including spillway replacement, would not lessen the impacts to the man-made features resulting from a PMF.

Implementation Strategy

The project's implementation strategy will be developed following the 1993 legislative session. Final repair and rehabilitation planning will begin shortly thereafter.

Summary

The DFWP and DNRC will determine the appropriate solution to the current problems of the Bearpaw Lake Dam based upon the results of the feasibility study and the recommendation of the engineering consultant.

B. NEW STORAGE PROJECT

This project is sponsored by the Bureau of Land Management (BLM). No state funding is currently being requested for the project.

1) CHERRY CREEK RESERVOIR PROJECT

The proposed project site is located approximately 3 miles northeast of the town of Terry, in the Cherry Creek drainage. Terry is located on the Yellowstone River, midway between the cities of Miles City and Glendive.

Description

The Cherry Creek drainage is comprised of approximately 384 square miles of rolling hills in northern Prairie County. Most of the runoff into Cherry Creek takes place as snow melts in February, March, and April, and is supplemented by spring rains in May and June. Summer recharge comes from subsurface storage in higher elevations but is not enough to offset summer evaporation. Bureau of Reclamation (Bureau) hydrologists estimate annual yield to the dam site at 4900 acre feet of water.

Background

The Bureau of Land Management (BLM) conceived the idea of constructing a reservoir on the Cherry Creek drainage as part of its commitment to improve access to recreational opportunities on public lands. The site was selected because of its favorable topography, soils, and location for a reservoir to satisfy public demand for fishing, boating, waterskiing, camping, picnicking, hiking, hunting, and other outdoor activities. The BLM committed $150,000 to study the feasibility of the project in 1989, and the state legislature appropriated another $100,000 that was matched with $50,000 from "Friends for Cherry Creek Dam, Inc." of the City of Terry.

A partnership was established among the "Friends," the Department of Fish, Wildlife and Parks, and the BLM. The BLM contracted with the Bureau to provide technical data, including cost estimates, hydrology and reservoir operation studies, flood hazard determinations, geologic reports, surveying and mapping, and analyses for pumping supplemental water from the Yellowstone River. The Bureau identified four possible dam sites and sizes and a 50-foot pool depth option was selected. This option will provide a reservoir capacity of 14,078 acre-feet of water with a surface area of 569 acres and meet all three stated objectives, which include sustenance of a fishery, enough area to provide quality recreation use, and a useful life of more than 50 years.

Current Status

A water right application was filed for the project with the DNRC in December of 1990. No objections to the application were received during the public comment period. Approval of the permit will be granted, subject to the findings of an ongoing joint DNRC/BLM environmental impact statement. A resources study is being completed to meet the requirements of the National Environmental Protection Act. The Montana Bureau of Mines and Geology has been contracted to drill test wells in the area of the proposed reservoir to determine seepage and water source capacity. The USGS will conduct studies of instream flow, sedimentation potential, and salinity. Land exchanges and purchases with private landowners of property located in the proposed recreation area are being negotiated and hopefully will be concluded in 1993.

Implementation Strategy

A funding request will be presented to Congress in 1994. The BLM has given the project a high priority status. If funding is approved, construction would commence in 1996. Cost estimates have been completed by the Bureau for construction of the earth-filled dam embankment, a gated outlet works, a service spillway, an auxiliary spillway, project design, and construction-related expenses. The 50-foot reservoir will have an estimated life of 136 years and will cost $9,940,465. The recreational facilities will be maintained by the BLM, private contractors, and by local volunteers.

Summary

Cost-benefit analyses over the life of the project indicate that the 50-foot pool depth option has positive returns on investment while accomplishing all three project objectives. The project would stimulate the depressed economies of Prairie County and the City of Terry. The project does not require funding from the state.

V. PROGRESS OF ONGOING STORAGE REHABILITATION PROJECTS

Several water storage projects were in progress prior to the effective date of the state's new water storage policy and legislation. The projects are in conformance with new storage policy priorities because they involve the rehabilitation of dams classified as high-hazard and unsafe. To meet the requirements of the water storage legislation, a progress report on the development of these projects is included.

MIDDLE CREEK DAM REHABILITATION

Middle Creek Dam is located 15 miles south of Bozeman in Gallatin County. The dam forms Hyalite Reservoir, named for the Hyalite Peaks of the Gallatin Range.

Background and Summary

Middle Creek Dam was completed in 1951 by the state Water Conservation Board. The 105 foot-high earthen structure could impound more than 7880 acre-feet of water. The water users increased the capacity to 8,267 acre-feet by adding flashboards. The dam is owned by the state of Montana and administered by DNRC. The Middle Creek Water Users Association contracts with DNRC for water stored in the reservoir and is responsible for repaying capital investments and operation and maintenance. The reservoir is the principal source of municipal water for the City of Bozeman.

A study of the work needed to bring Middle Creek Dam into compliance with current dam safety standards was completed in 1985. An undersized spillway resulted in the dam being classified as unsafe. The dam is classified *high-hazard* due to the potential for loss of life in the event of failure. In 1987, DNRC applied to the Bureau of Reclamation for a Small Projects Reclamation Loan. The loan was approved and the project was funded by Congress. Approximately 25 percent of the project funds were allocated from the DNRC rehabilitation budget. DNRC awarded a contract for the project in January, 1991, and construction began in May of 1991. The cost of rehabilitating Middle Creek Dam was $5.2 million. The project was complete in October of 1992 with the dedication by Governor Stephens.

The rehabilitation raised the earthfill dam embankment by 10 feet and the reservoir pool level by 8.2 feet, creating a capacity of 10,184 acre-feet. An earthen emergency spillway was constructed in the left abutment. A reinforced wall system with conventional earth fill at each end was constructed to raise the dam embankment 10 feet. Upper and lower auxiliary spillways were constructed in 1992. A new campground and a day-use area were completed during the 1991 season. The project increased reservoir capacity while repairing and rehabilitating an unsafe dam that has been classified as high-hazard.

LIMA DAM REHABILITATION

Lima Dam is located on the Red Rock River approximately 15 miles east of the town of Lima in extreme southwest Montana.

Description

Lima dam is an earth embankment structure, 54 feet high and 455 feet long. The dam is able to impound approximately 84,000 acre-feet of water. The average storage has been approximately 27,000 acre-feet. The water from the dam is used to irrigate 16,221 acres in the Red Rock River Valley.

Background

The dam was originally constructed in 1890 and rebuilt in 1909 and 1933. The dam is currently owned by the Beaverhead County Red Rock River Water and Sewer District and is operated under a cooperative agreement by Water Users Irrigation Company, a consortium of twenty-six irrigators.

Lima Dam was inspected by the U.S. Army Corps of Engineers in 1980 under the National Dam Inspection Program and was classified as *high hazard*. Failure of the dam would result in a significant loss of property and human life. The dam is classified unsafe because the spillway lacks the capacity to route the PMF.

The water users contracted with the consulting engineering firm of HKM Associates to develop alternatives to bring the dam into compliance with current dam safety standards. HKM and Associates completed their study in 1989 and recommended the following major changes to the structure:

1) Replace the entire outlet works to include tunnels, control gates and control tower.

2) Re-contour the downstream face of the dam and cover it with roller compacted concrete to provide erosion protection during overtopping by large floods, such as the PMF.

3) Replace the existing principal spillway with a new roller-compacted concrete spillway.

The 52nd Montana Legislature approved the District's application for a water resource development loan of $3,040,000 with the passage of HB 007. A three-percent interest rate for the 30-year term of the loan was established by the legislature. After approval of the loan by the legislature, HKM Associates was retained by the water district to complete the final design of the project.

In addition to its importance for irrigation, Lima Reservoir is important to wildlife management in southwest Montana. The reservoir and the migratory birds it attracts comprise important habitat for the peregrine falcon, an endangered species. Most of the six nesting pairs of peregrine falcons were bred in captivity and released in the area as part of a national species repatriation program. The reservoir supports the largest population of non-breeding, molting Canada Geese in the northern Rockies. The reservoir is also used by about 100 young molting trumpeter swans and 20 pairs of adult trumpeters nest in the area. The area also serves as a nesting and roosting area for many sandhill cranes and as prime habitat for bald eagles.

Lima Reservoir is the furthest upriver storage reservoir on the Missouri River system and plays an important part in the regulation of the Red Rock River, a chronically-dewatered river. Although the dam has limited flood control capability, it can serve to augment instream flow in the Red Rock River, helping to restore and sustain a viable trout fishery. The reservoir assists in the recharge of groundwater in the area.

Current Status

On August 6, 1992, the owner-district awarded a contract to a Torrington, Wyoming contractor to complete the rehabilitation of the dam. As of October 30, 1992, the contractor had completed approximately half of the work. The roller-compacted concrete spillway and the downstream dam face protection will not be complete until the spring of 1993. The district, HKM Associates, and DNRC are negotiating an operating plan for the reservoir. The reservoir has been drained for construction.

Summary

The rehabilitation of the Lima Dam should be complete by late summer, 1993. HKM Associates estimated the cost of rehabilitating Lima Dam at $3,040,000. The total cost of the project is now estimated to be $2.6 million. The storage capacity of the reservoir will not be increased by the project. Completion of the rehabilitation project will bring Lima Dam into compliance with applicable dam safety standards.

COMO LAKE DAM REPAIR AND REHABILITATION

Como Lake Dam is located on the east slope of the Bitteroot Range, approximately 15 miles south of Hamilton in extreme western Montana. The reservoir, Lake Como, is fed by Rock Creek, a mountain stream that drains an alpine valley originating on the Idaho border.

Description

Como Dam is an earth-filled dam built between 1908 and 1910 by local irrigators and owned by the Bitterroot Irrigation Company. The dam measures 70 feet high and has a crest length of 2,565 feet. Lake Como's total storage capacity is 35,600 acre-feet and its surface area is 913 acres. Water is released from Lake Como during the summer to irrigate 16,635 acres of land within the Bitteroot Irrigation District for the production of alfalfa, grain, and livestock pasture.

Background

Lake Como's water is stored during the spring when the drainage's mountain snowpack melts. The lake provides a variety of flatwater recreation opportunities to residents of Ravalli County and the state. The site's average annual precipitation is 13 inches. By September the reservoir portion of the lake is nearly empty.

The existing spillway, constructed in 1923 and modified in 1976, is located at the dam's left abutment. The spillway has a discharge capacity of 5,460 cubic feet per second. It consists of a concrete control and transition section with flashboard bays, a concrete chute, a natural rock stilling basin, and a downstream channel. A steel bridge spans the spillway to provide access to the Forest Service recreational facilities that include a boat launch ramp, a paved access road and parking area, beaches, camp sites, and trails. The Forest Service is currently designing and developing additional recreation facilities at Lake Como.

Since 1984, Como Dam has undergone detailed and intensive investigations under the federal Safety of Dams Program. Observations made during reservoir filling and draw-down cycles of the past three years have provided documentation of more than 50 recorded physical symptoms indicating movement within the dam embankment. This may be evidence that widespread internal erosion of foundation materials is taking place, which eventually could cause the dam to fail.

The acceleration of abnormal conditions observed in 1991 indicated that it was no longer safe to operate the dam in the normal manner. Lake Como's water surface elevation was lowered by 8.7 feet during the 1991 irrigation season resulting in a reduction in reservoir capacity of 8,000 acre-feet (25 percent). In 1992, as the reservoir filled to the restricted level, continuing evidence of extreme stress indicated that a progressive dam failure could be taking place. On June 19, 1992, emergency draw-down of the reservoir was begun.

Seismic investigations at Como Dam have revealed that the materials and methods used in constructing the dam in 1910 are vulnerable to the phenomenon known as liquefaction. Under liquefaction, low-density materials such as those that comprise the Como Dam embankment lose their supportive strength and assume the physical properties of a fluid. Como Dam shows a significant risk of failure during an earthquake because the associated shaking of the ground causes liquefaction.

A hydrologic evaluation of Como Dam has indicated additional potentially hazardous conditions. For Como Dam, the probable maximum flood (PMF) caused by a severe thunderstorm presents the most severe scenario for inhabitants of the floodplain below the dam. It is estimated that a flood exceeding 67 percent of the PMF for a thunderstorm would overtop Como Dam and cause it to fail.

Current Status

On July 27, 1992, the Bureau of Reclamation (Bureau) completed a Safety of Dam modification report on Como Dam that went to Congress on August 17, 1992. On August 14, 1992, a basis of negotiation for repayment by the Bitterroot Irrigation District of 15 percent of Safety of Dam program costs was approved by the district and the Commissioner of the Bureau. The 1993 Water and Energy Appropriation Bill waived the required 60-day Congressional review required for the expenditure of construction funds.

On August 25, 1992, the primary construction contract was awarded to Barnard Construction Company, Inc. of Bozeman for $2.9 million. Construction of features that provide embankment stability and prevent internal erosion of embankment and foundation materials are underway and scheduled to be complete by April 15, 1993.

Implementation Strategy

Reconstruction will raise the embankment by 5 feet and modify the spillway structure to safely accommodate large floods. The outlet works conduit will be fitted with a steel liner pipe to meet Bureau evacuation criteria. Excavation of the downstream slope embankment, the dam crest, and a drain trench at the toe of the dam are nearly complete. Processed sand and gravel are being placed in the toe drain trench. The outfall pipe, some drain pipe, and two manhole structures have been installed. With completion of the embankment and outlet tunnel modifications, the irrigation district anticipates being able to fill the reservoir next spring without any loss of irrigation benefits. During the summer of 1993, a gate tower access bridge, spillway crest modifications, a pedestrian spillway bridge, and site seeding are planned for completion.

An option to raise the dam crest an additional 3 feet to provide 3,000 more acre-feet of storage received enthusiastic support from the irrigation company and local residents. The anticipated purpose of the raise in dam height would be for use in minimum instream flow augmentation on the Bitterroot River to enhance the fishery and recreation opportunities. A 9-foot raise in the dam crest had been discussed during the planning stage of repair but, has since been precluded by financial, meteorological, logistical, and legal constraints. A 3-foot raise in the dam crest, and the additional storage that would result, remains a possibility for the near future.

Summary

The design and construction technology used in 1910 are directly responsible for the present internal erosion of materials at Como Dam. Methods employed during construction are now known to contribute to unstable embankments that can slump and fail during earthquakes. The current spillway structure is not adequate for routing more than 67 percent of the PMF. The repair of Como Dam is of great concern to the people of Ravalli County and of Montana. The Como Dam repair project represents a successful, coordinated response to a potentially catastrophic situation.

VI. APPENDIX "A"
JUSTIFICATION FOR WATER STORAGE PROJECT PRIORITIZATION

The governor's report must include a list of water storage priorities and an implementation strategy for each priority project that identifies the necessary resources and government actions. Implementation strategies and necessary actions have been included in the foregoing sections for each project. Statutory criteria have been referenced for each project in its respective section as well. The following project prioritization includes grant and loan proposals.

The Tongue River Dam rehabilitation would be the first project grant ever funded by the newly-created state water storage development special revenue account. The entire proceeds of the account will be used for this project if the funding recommendation is approved by the legislature.

The remaining project proposals have been recommended for grants and/or loans from the Water Development Program. The Water Development Program has its own set of criteria for the ranking of applications with water storage proposals receiving highest priority. The following section provides the legislature with the list of water storage priorities using the statutory criteria of 85-1-704 MCA as a guide.

Reported Projects Not Included in the Project Ranking Summary

The Middle Creek Dam and the Lima Dam rehabilitation projects are not included in the ranking analysis because they were in progress prior to July 1991, the effective date of Section 85-1-704 MCA. They are included in the report because the water policy statute requires a "progress report on the development of water storage projects during the previous 2 years." Both projects are consistent with current policy because they involved the rehabilitation of high-hazard, unsafe dams.

The Como Lake Dam rehabilitation project is not included in the following analysis because the project is funded by the federal government under the auspices of the U.S. Bureau of Reclamation Safety of Dams program and is nearly complete. A financing arrangement was negotiated for a 15 percent repayment by the Bitterroot Irrigation District, which owns the dam. Because the Cherry Creek Reservoir proposal is the only new proposed project, there was no need to rank it.

Projects Prioritized by Statutory Criteria (85-1-704 (2-4) MCA).

The following six proposed rehabilitation projects and one new project are prioritized according to the criteria identified by Montana Code Annotated (MCA) listed at the beginning of this report.

Rehabilitation Projects

1) Tongue River Dam Rehabilitation

This project has been the highest water storage priority since it was identified as such by Governor Stephens in 1990. A moderate flood in 1978 caused $1,000,000 damage to the spillway and demonstrated the potential for disaster on a large scale. The dam has been classified by the Army Corps of Engineers as a high-hazard dam because its failure would jeopardize 7000 human lives. The Corps further classified the dam as unsafe due to the spillway's inability to carry overtopping water from a probable maximum flood (PMF). The dam's rehabilitation will greatly contribute to the settlement of the federal water rights of the Northern Cheyenne Tribe. The proposed 1994-95 biennium funding arrangement for the Tongue River Dam rehabilitation project calls for $1,415,000 from water development funds, $460,000 of water storage account funds, and $11,256,000 in federal funds, for a total of $13,131,000. It is appropriate that the project receive a $460,000 water storage development grant.

2) North Fork of the Smith River Rehabilitation

This project proposal has been recommended for a water development loan of $1,393,467. The Corps has classified the dam as high-hazard due to the potential for loss of life and unsafe due to inadequate spillway capacity. In addition to public safety considerations, the project supports a sizable regional economic base of agriculture. The amount of the recommended loan is eclipsed by the monetary damage that would result if the facility was breached as a result of a large storm. DNRC will negotiate with the Smith River Water Users Association for repayment of the requested revenue bond. The rehabilitation will provide additional flood storage and irrigation water, and a minimum pool for fish and wildlife. The area will realize additional economic benefits from increased recreational opportunities at the reservoir.

3) Tin Cup Lake Dam Rehabilitation

This project has been recommended for a $302,204 water resource development loan. The dam has been classified as unsafe by the Corps, the Forest Service and DNRC due to inadequate spillway capacity. It is classified as high-hazard due to the potential for loss of life in the event of failure. The dam is owned and operated by the Tin Cup Water Users Company and repayment of the loan will be made from user fee proceeds. The dam supplies water to 1,300 acres of farmland in the Bitterroot Valley. Additional benefits of the dam include limited flood control, ground water recharge, enhancement of instream flows for fisheries, public recreation opportunities, and improved water quality through the control of streambank erosion and stream sedimentation.

4) Malta Irrigation District Canal Efficiency Improvement

A $50,000 grant and a $50,000 loan to the Malta Irrigation District have been recommended to the legislature following the Water Development Program application review process. A grant of $100,000 had originally been requested. The estimated cost of the proposed project is $498,000. The $398,000 difference will be covered by the Malta Irrigation District through user fees.

It is estimated that the project would allow an additional 13,000 acre-feet of water to be stored annually at Nelson Reservoir. Storage activities must be concluded before the nesting period of the piping plover, a "threatened species" under the Endangered Species Act. A Bureau of Reclamation study of the Malta Irrigation District irrigation system found that new check structures at Dodson Canal South were critical to keeping the area's water distribution system operational.

The proposed project will increase the efficiency of a water conveyance and distribution system in need of rehabilitation. The proposal will provide more water for irrigation, migratory bird habitat, fishery habitat, and for recreation. Increased water storage at Bowdoin National Wildlife Refuge is another project benefit stated in the grant application. No citizen opposition to the project has been documented. The project has the potential for mitigating the effects of the upstream Indian tribes' use of additional water. Settlement of tribal federal reserved water rights is being negotiated. The project would make more water available to the non-Indian water users located downstream. The project will also reduce seepage from the canal and decrease the salinity of adjacent lands, improving water quality.

5) Lone Tree Dams Rehabilitation Study

Richland County's proposal for this dam rehabilitation study has received a recommendation for a grant of $60,850 following review by the Water Development Program grant application process. The Corps classified the two Lone Tree Dams as *unsafe* due to the inability of the spillways at both dams to route the probable maximum flood (PMF), and *high hazard* because of the threat to human life in the event of dam failure. The town of Sidney could sustain significant loss of life and negative economic impacts if the dams failed.

The dams would continue to provide water for irrigation and flood protection if rehabilitation is a viable alternative. Indications of broad public support for the study are present and a wide range of recreational opportunities would be available if public access can be arranged. The owner of the dams, Lone Tree Ranch, Inc., has committed about 15 percent of the funds needed for the proposed study and as potential project beneficiaries, Richland County and Sidney will contribute to the study costs. The proposed engineering study is necessary before an alternative can be selected.

6) Bearpaw Lake Dam Rehabilitation

Bearpaw Lake Dam is owned and operated by the Department of Fish, Wildlife, and Parks (DFWP) as a recreational facility. The DFWP has requested funding from the 1993 Legislature to rehabilitate the dam. The Corps classified the dam as "intermediate" in size with a "significant downstream hazard" potential. In 1989, the dam was classified as high-hazard under Montana Dam Safety Act guidelines. A Corps study of the Bearpaw Dam indicated that the dam would be overtopped when 9 percent of the probable maximum flood (PMF) takes place. The PMF is the flood expected from the most severe combination of meteorologic and hydrologic conditions reasonably possible for the region.

The dam is constructed of materials that would erode quickly and fail when overtopped by flood waters. A sudden breach of Bearpaw Lake Dam would damage bridges and the highway downstream and would endanger the lives of campers and recreationists who use the area extensively during the summer. No permanent residences are located downstream of the dam. A feasibility and risk-analysis study is being conducted by an engineering consultant to determine whether Bearpaw Lake Dam will require complete rehabilitation to meet Montana Dam Safety Act requirements.